DOCUMENT RESUME

ED 384 522 SE 056 535

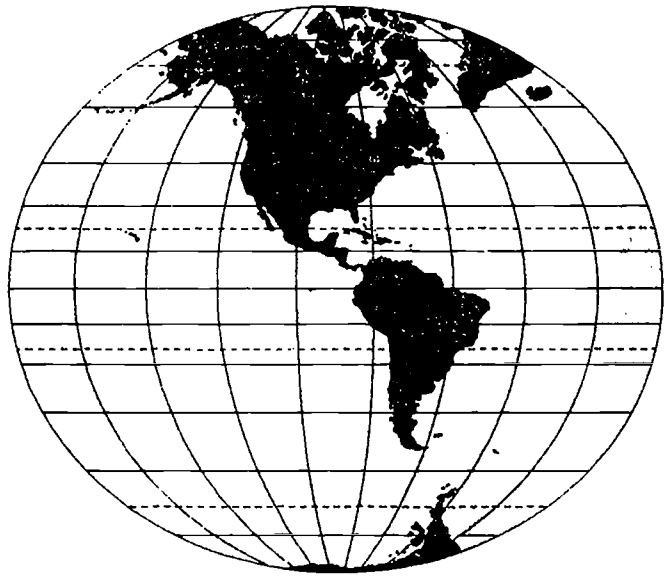
TITLE	Healthy Water, Wealthy World. Conservation Camp 1995 Workbook. A Companion Workbook to a Day in Nature's Classroom for Sixth Grade Students and Teachers in Claiborne, Grainger, Hancock, Hawkins and Union Counties.
INSTITUTION	Clinch-Powell Resource Conservation and Development Council, Rutledge, TN.
PUB DATE	95
NOTE	29p.; Project funded by the Tennessee Dept. of Agriculture and the Tennessee State Planning Office.
PUB TYPE	Guides - Classroom Use - Instructional Materials (For Learner) (051) -- Guides - Classroom Use - Teaching Guides (For Teacher) (052)
EDRS PRICE	MF01/PC02 Plus Postage.
DESCRIPTORS	Earth Science; Environmental Education; *Field Studies; Field Trips; Grade 6; Habitats; Intermediate Grades; Land Use; Waste Disposal; *Water Pollution; *Water Quality; Wildlife; Workbooks
IDENTIFIERS	*Streams; *Tennessee

ABSTRACT

This student workbook is designed as a companion to a day of field studies investigating water quality and stream health for sixth grade students in several northeastern Tennessee counties. Nineteen environmental education activities cover topics including wildlife species, wildlife habitats (instream and riparian), connections between water quality and wildlife, water pollution, hydrology, land use, soil and water, wild plants and flowers, farming techniques, erosion prevention, forest ecology, waste disposal, household hazardous wastes, landfills, and precycling and recycling. The workbook provides the following information for each activity: objective, key words, summary (background information that refers to the northeastern Tennessee environment), and study questions. A glossary contains 65 key terms. (LZ)

HEALTHY WATER WEALTHY WORLD

CONSERVATION CAMP 1995 WORKBOOK



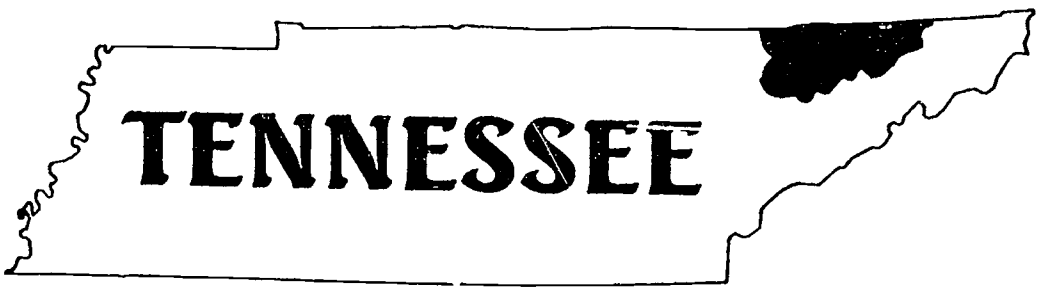
A companion workbook to a day in nature's classroom for sixth grade students and teachers in Claiborne, Grainger, Hancock, Hawkins and Union Counties.

Sponsored By

The Clinch-Powell RC&D Council
Environmental Education Program

THIS PROJECT IS FUNDED IN PART THROUGH GRANTS FROM THE TENNESSEE DEPARTMENT OF AGRICULTURE AND THE TENNESSEE STATE PLANNING OFFICE THROUGH CONTRIBUTIONS FROM CLAIBORNE, GRAINGER, HANCOCK, HAWKINS AND UNION COUNTIES.

Printed on Recycled Paper



CLINCH-POWELL

RC&D COUNCIL ENVIRONMENTAL EDUCATION PROGRAM

ROUTE 2, BOX 423, RUTLEDGE, TN 37861

(615)828-5927

We wish to extend sincere thanks to the following groups and individuals for their invaluable help in making the Camps possible.

AmeriCorps
Claiborne County Board of Education
Grainger County Board of Education
Hancock County Board of Education
Hawkins County Board of Education
Union County Board of Education
Tennessee Department of Agriculture - Ag Resources Division
Tennessee Department of Education
Tennessee Department of Agriculture - Division of Forestry
Tennessee Highway Patrol
Tennessee State Planning Office
Tennessee Valley Authority - Resevoir Management
Tennessee Wildlife Resources Agency
UT Extension Service
USDA Natural Resources Conservation Services
Claiborne County Government
Grainger County Government
Hancock County Government
Hawkins County Government
Union County Government
East Tennessee Development District
First Tennessee Development District
Claiborne County Soil Conservation District
Grainger County Soil Conservation District
Hancock County Soil Conservation District
Hawkins County Soil Conservation District
Union County Soil Conservation District
Grainger County SCD Youth Board
Cumberland Mountain Research Center - Lincoln Memorial University
Grassy Creek Wildlife Foundation
Tennessee Department of Environment and Conservation - Division of Water Pollution Control
Partners for Clean Communities Regional Keep America Beautiful System
Grainger County Ambulance Service
UT County Technical Assistance Service
USDA Forest Service
The Nature Conservancy
Learn and Serve America - Youth Leadership Council

HEALTHY WATER, WEALTHY WORLD
CONSERVATION CAMP
WORKBOOK

TABLE OF CONTENTS

FISHY WHO'S WHO

Objective

Students will expand their knowledge of the different species of fish that occur in this area and why clean water is important to them.

Key Words

Species, Scavenge, Predator, Detrius

Summary

There are fish in virtually every area of North America. They play a variety of roles in the aquatic ecosystems. Some are predators on other aquatic life. Some are feeders on plant material. Still others scavenge or feed on detrius. Some species deposit eggs in special nests, some have live young. They exhibit a wide range of behaviors.

While some are well known by those who fish, others are less conspicuous to humans. The health and well-being of these species depends on the quality of the water.

Study Questions

1. Name five species of fish that are important to the rivers in your area.

2. Why are those fish important?

3. What dangers are facing the aquatic life in the Clinch and Powell Rivers?

RIPARIAN RETREAT

Objective

Students will recognize the characteristics of riparian habitats and understand the importance of these areas to clean water, animals, plants and humans.

Key Words

Riparian, Marsh, Nesting Birds, Burrowing Animals

Summary

Riparian areas are important and valuable in many ways. Riparian areas are in the green ribbons found on the edges of water courses (streams, lakes, ponds). These conditions are excellent for plants that grow best when their root systems are near water.

Riparian areas provide space, food, shelter and water for plants and animals. Riparian areas are also "highways" for animals that depend on water bodies for food and shelter. The plants in these areas provide food and shelter for animals as large as deer. Trees and marshy areas provide shelter for nesting birds and the water banks provide homes for burrowing animals.

The dense vegetation found around many riparian areas cleanse runoff water before it flows into the stream. Among the many values of riparian areas are their beauty and recreational values to humans. They are used for fishing, hiking, camping, picnicking and resting.

Study Questions

1. List 10 things you would expect to find in the riparian areas on the Clinch and Powell Rivers.

2. What are some other words you know used to describe riparian areas?

3. Name four animals that you would expect to find in a riparian area.

WATER CHECK-UP

Objective

Students will learn to observe water quality monitoring equipment and how it is used. They will see aquatic invertebrates and determine the chemical condition and biological health of the stream.

Key Words

Benthos, Dissolved Oxygen, Indicator Animals, Rapid Bioassessment Survey, Turbidity, Aquatic Invertebrates

Summary

There are many ways to determine the water quality and the overall health of a stream or river. Biologists often use a process called Rapid Bioassessment Survey, which test the physical properties and the biological community (benthos) to quickly determine the quality of the water.

Invertebrate(no backbone) animals known as aquatic invertebrates that live a portion of their life on the bottom of streams , rivers and lakes are known as benthos. Benthos, as with other animals, have certain habitat requirements, such as dissolved oxygen and low turbidity, in order to live and grow within their environment. Sometimes things can happen to an environment, such as pollution, that will affect the diversity and numbers of animals that are able to live there.

By collecting and counting the individual kinds of benthos in a stream, especially indicator animals, an investigator can determine if pollution is occurring or has recently occurred. Some indicator animals are very sensitive to water pollution and cannot live in polluted streams. Others can tolerate high amounts of pollutants. The presence or absence of certain invertebrates helps the biologists determine the water quality of a stream.

Study Questions

1. What is water pollution?

2. Name as many different kinds of pollution as you can.

3. How are aquatic invertebrates indicators of water quality?

WATER AND WILDLIFE HABITAT

Objective

Students will understand the importance of clean water for wildlife habitat.

Key Words

Pollution, Habitat, Predator

Summary

Wildlife population is dependent upon the quality of the habitat. The habitat must include food, water and cover. The population of a given species of wildlife is determined by the most limiting factor. There are many sources of water for wildlife. Rivers, lakes, ponds, streams, dew and potholes are all sources of water.

There are several sources of pollutants that pose dangers for wildlife. Water may be contaminated from pollutants from several sources. These sources include sewage, industrial construction, solid wastes, agriculture and household chemicals.

Study Questions

1. Name specific examples of pollutants from the sources listed in the discussion.

2. What determines the population of a specific species of wildlife in a given area?

3. How could a predatory animal be poisoned by contaminates found in the mud at the bottom of a lake?

WATCH OUT FOR WILDLIFE

Objective

Students will develop an awareness and appreciation for locally important threatened and endangered wildlife species.

Key Words

Habitat

Summary

The quality of our water has both direct and indirect effects on our wildlife species. Grassy Creek Wildlife Foundation deals with some of these effects on migratory birds as we attempt to rehabilitate many that have suffered from assorted water hazards. A number of our threatened avian species within Northeast Tennessee depend either on water or marshland habitat areas for their existence and we hope to acquaint the children with ways they can help those already affected and offer suggestions about how they can prevent adverse affects on others. Their awareness of habitat importance is the first step. followed by an understanding of particular species requirements within these areas. We hope to instill both desire to help and confidence that their efforts can make a difference.

In order to accomplish this, we intend to show them freeze-dried specimen of waterfowl and marsh birds, an assortment of posters, and tell them about the threatened and endangered ones in our part of Tennessee. We will relate this to particular water pollution problems and tell them how they can directly help the birds through actual clean-up methods and indirectly through legislative means.

Study Questions

1. Can you list three avian species that are affected by polluted water?

2. How many pollution hazards can you name that harm our avian species?

3. Why is it important to try to save the threatened and endangered avian species which use wetlands and marshlands?

PICNICS ARE FUN?

Objective

Students will gain an understanding of the public pressures placed on public lands and the problems associated with use.

Key Words

Tennessee Valley Authority, Public Lands, Reservoir, Stewardship, Erosion, Vandalism, Pollution

Summary

Americans have more leisure time today than ever before. This is putting more and more pressure on public lands. Many private landowners have problems on their land when public users do not ask permission to use their land. This is trespassing and it is illegal. Permission is always needed from private landowners to use their land.

Public lands are important to nearby communities. The recreation industry depends on public reservoirs and rivers for their livelihood. The positive economic impact means more tax dollars for schools and community services.

The increased tourism may also cause environmental problems in the area. Careless tourists may leave behind trash and litter which are detrimental to the environment. They may cause forest fires by being unsafe with campfires and matches. They may needlessly damage the local wildlife by damaging their habitat.

There are many problems associated with the public's use of the land, but there are also many benefits. Good stewardship will keep these lands beautiful, safe and available for everybody.

Study Questions

1. List 4 or 5 major problems or negative impacts associated with recreational use of public lands.

2. What 3 major things do TVA dams provide for the public?

3. List 5 or six activities you can do on public lands.

4. Recreational use of TVA's reservoirs and rivers has contributed to the economic growth of the area. Name businesses that support the recreational needs of people in this area.

WHERE DOES YOUR WATER FLOW?

Objective

Students will learn some of the basic components of forest hydrology and be presented an example of how it can affect wildlife.

Key Words

Forest Hydrology, Watershed

Summary

Forest hydrology is the study of water inflow and outflow in a forest ecosystem. The basic unit of study is the watershed, which is most easily visualized using topographic maps on which watersheds can be plotted. Factors such as climate, vegetation type, season, soil and parent material interact to influence the input and output of water from the forests streams.

Various factors will be discussed. Also a case history of how wildlife can be adversely affected by poor forest management practices will be presented.

Study Questions

1. What are some of the major and minor watersheds in which you live?

2. How can a forest store water?

3. Can the unchecked force of water be detrimental to ecosystems and populations of plants or animals?

SOIL AND WATER

Objective

To demonstrate different characteristics of soil and the way it acts with water.

Key Words

Soil, Percolate, Saturation, Slope, Impurities

Summary

There are many different types of soil on earth. Soil is composed of air, minerals, organic matter, sand, silt and clay. Each of these components are present in varying amounts in different types of soils. Soils are generally characterized as sandy, loamy or clayey.

Sandy soils are those with a large percentage of sand. These soils feel gritty and sand particles are visible. When sandy soil is squeezed in a ball in your hand, it will not hold shape. Loamy soils are those with a good mixture of sand, silt and clay particles. When loamy soil is squeezed in a ball in your hand, it will hold its shape, but will break up easily. This is a very good soil for farming. Clayey soils are those with a high percentage of clay particles. When a clayey soil is squeezed in your hand it will hold a ball shape very well. It may look somewhat like play-doh.

Soils act as nature's filter and clean impurities out of the water before it reaches our groundwaters. The next time you see it raining hard, watch how rain drops splash soil. As more and more rain falls, some of the water begins to run off the soil. Little trickles become big trickles. Some of this water will soak into the soil, but some will run off. Land with a good cover of grass or trees will have clearer runoff water than lands with bare soil areas.

Study Questions

1. How does soil affect how much water recharges the groundwater supplies.

2. How do soils purify water?

3. Which general type of soil do you think will have the most serious erosion problem?

THERE ARE NO WEEDS!

Objective

To develop an understanding of wild plants and flowers and their uses.

Key Words

Wildflower, Herb, Weed

Summary

All flowers and plants have a place in nature, but some may be considered weeds if growing in an undesirable location, such as dandelions in a lawn. Common wildflowers and plants can be identified with the help of guidebooks and people who have studied plants. While some herbs grow in the wild, proper precautions in selection and preparation should be taken.

Some wildflowers can be grown in gardens and add beauty to a home, but must have the same environment as when growing wild - shady, damp soil in the woods or around your home.

Study Questions

1. Name 5 wildflowers sometimes considered weeds.

2. What precautions should one take before considering a plant as an herb?

CONSERVATION FARMING

Objective

Students will gain an appreciation for different kinds of farming practices and how they affect water quality.

Key Words

Conservation Tillage, Pesticide, Herbicide, Fungicide, Fertilizer, Grassed Waterway, Contour Farming, Cover Crops, Crop Rotations, Strip Cropping

Summary

Farmers use chemicals to help them grow food and fiber crops. These chemicals may include herbicides, fertilizers, fungicides, pesticides and others. When they are used correctly and disposed of safely are very beneficial. Without them it would be very difficult for farmers to produce enough food to feed all the people in the world.
Farming practices have a big effect on water quality. Practices such as "turn plowing" expose bare soil and make it easy to wash away during heavy rains. This is called soil erosion. When soil washes into streams, rivers and water supplies, it pollutes the water by making it muddy. The soil particles also carry chemicals which may be poisonous to aquatic life.

The best farmers use conservation practices to protect their soil. One of the best practices is conservation tillage. Conservation tillage is a method of farming which leaves a cover to protect the soil surface and prevent pollution. Other types of conservation practices are grassed waterways, contour farming, cover crops, crop rotations and strip cropping.

Study Questions

1. Name a good conservation farmer you know.

2. Which conservation practices does this farmer use?

3. Name three advantages of conservation farming.

LITTER BUG BLUES

Objective

Students will learn about the legal and proper disposal of waste and the penalties for illegal disposal. They will learn about recycling and the reuse of products.

Key Words

Toxic, Energy, Recycling, Biodegradable, Incinerate

Summary

There are many toxic chemicals used in the world. If not used properly these chemicals can be very hazardous. Most chemicals are required by law to be labeled to tell of the specific dangers to humans and the environment. Household chemicals should not be mixed together. Chemicals which are fairly safe when used alone, may become toxic when mixed together.

Litter and garbage can also be dangerous to human life and wildlife. Water passes through all trash which is left on top of the ground and then travels into the rivers, lakes and drinking water sources. This water is polluted and possibly poisonous. Garbage should be dispose of safely to keep water clean.

There are laws against littering in Tennessee. Penalties may include fines and jail time.

Recycling is an excellent way to decrease the amount of garbage on earth and to conserve natural resources. We can make choices in our lives that will be beneficial to the environment and to our fellow humans.

Study Questions

1. Name five things you can start recycling in your home.

2. How can we reduce the amount of garbage we produce?

3. How does it help the environment to reuse or recycle things?

SINKHOLES SHOULDN'T BE STINKHOLES

Objective

Students will become aware of the dangers to the underground water supply when trash and wastes are dumped into sinkholes.

Key Words

Sinkhole, Contaminate, Crevice, Limestone

Summary

Sinkholes are very common in East and Middle Tennessee. They are formed when limestone rock below the surface of the soil wears away and collapses. Sinkholes look like "bowls" in a field. You can be sure an area is a sinkhole if all the water which drains into it can only leave by seeping through the ground. Sinkholes can be very large or small. They are very important to us because they "catch" rainwater and then releases it slowly into the groundwater supplies.

Many people use sinkholes as personal dumps. They dispose of pesticides, household garbage, dead animals, chemicals and other items into the sinkholes. This is dangerous because sinkholes drain directly into the underground water supply.

Instead of rainwater being purified by passing through layers of soil, it passes over the garbage and chemicals into the sinkhole. It then travels through cracks and crevices in the limestone rock to reach the underground water supply. This is the same water supply that people use in their homes if they have a well or use spring water. If the water has passed through a dump in a sinkhole, it may be contaminated and dangerous to drink.

Study Questions

1. Are there sinkholes in your area?

2. What type of wastes are being dumped in them?

3. What diseases can people get from contaminated underground water?

LEAF LITTER LEGACY

Objective

Students will recognize the value of leaf litter on the forest floor in preventing erosion and water pollution.

Key Words

Best Management Practices, Stream Management Zone

Summary

Forests can contribute to soil erosion and water pollution problems when careless activities are carried out. Approximately six percent of the sediment in streams is a result of forest erosion. There are 7.9 million tons of soil lost from forests each year. Cattle grazing, logging roads, skid roads and log landings are the primary causes of forest erosion.

Leaf litter on the forest floor and healthy tree root systems are the best protection from erosion. When timber is harvested or after a fire, more erosion occurs because the leaf litter is gone. when soil moves it has a detrimental effect on the forest.

There are conservation practices which can be used during logging activities to protect the soil. Loggers who care about the forest and the land will build log roads in a way which controls runoff water before it reaches the streams. These types of activities are called Best Management Practices. Landowners who are planning to have timber harvested should require loggers to use BMPs on their land.

Study Questions

1. What happens to leaf litter after it decomposes?

2. Name ten different uses of forest products.

3. Why are gullies and erosion problems hard to fix in forested areas?

WHERE DOES THF WASTE GO?

Objective

Students will learn what happens to the garbage they throw away and how critical it is that they learn to reduce the volume.

Key Words

Decompose, Solid Waste, Recycle, Landfill, Reclaim

Summary

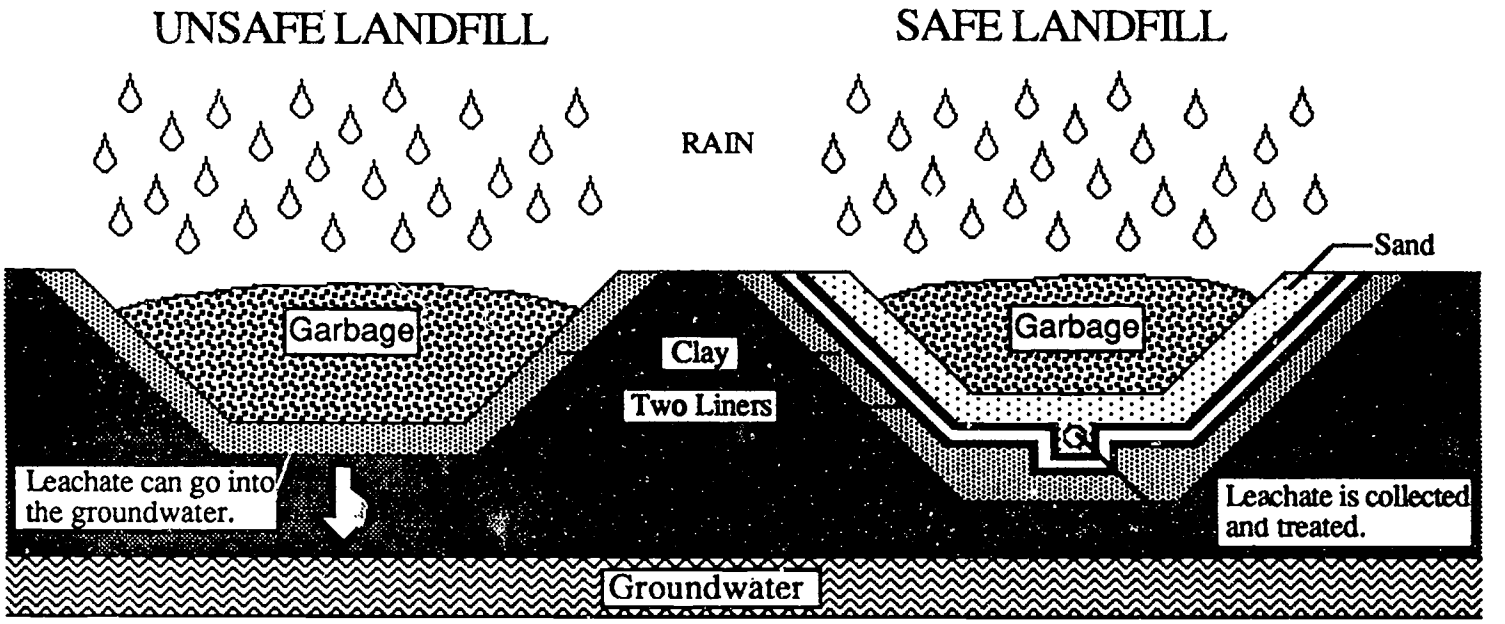
Every day we throw out everything from toothpaste tubes to old TV sets, car batteries to plastic milk jugs, jelly jars to paper. You may not personally stuff six pounds of solid waste in the trash bag everyday, but if you add up all the waste from your house, classroom and school cafeteria, from the restaurant where you ate, from the factories that make your clothes or paper, from the utility that generated your electricity and from the stores where you shopped, it amounts to about 6 pounds a day per person. Multiply that by 365 days per year, then 4.9 million Tennessee citizens, and your results show that Tennessee throws away more than 5.4 million tons of stuff each year! But, where is "away"? Is there such a place?

Most of Tennessee's solid waste ends up in landfills. A landfill is a place where waste is dumped, compacted and covered with dirt. Covering the trash everyday controls blowing paper, odors, insects and rodents. Unfortunately, many existing landfills, built before we realized the importance of strict environmental rules, now present a hazard to public health and the environment. When rainwater or melting snow seep into these poorly constructed landfills, reactions between the water and the trash produce a liquid called leachate. Leachate contains concentrated pollutants that can be harmful if it migrates into streams or groundwater. As waste decomposes in the landfill, explosive landfill gases develop which can move outward through he soil, killing vegetation and entering basements of nearby houses.

We will be paying to clean up and reclaim many of these leaking landfills for years to come. Even though the old landfills are serious environmental problems, we have learned some valuable lessons from them. Recently, new laws have been passed that require landfills to be constructed so to reduce the potential hazards to our environment. The laws specifically protect goundwater, control explosive gases and reduce the amount of toxic waste entering the landfills. The following diagram illustrates some of the differences between old landfills and the standards to which new landfills must be built.

The new landfills require protective man-made liners to retain the leachate like a plastic bowl. Leachate and landfill gases are collected and pumped out of the landfill through a piping system. The leachate is treated at a waste water treatment plant and turned into safe, clean water. The gases can be burned as fuel for heating and cooling buildings. The landfill operators must carefully and frequently test the groundwater, surface water and air around the landfill to insure that no contaminates are entering the environment.

But what is the solution to our garbage glut?
Reduce, reuse, recycle. Each year Americans throw away approximately 60 billion cans, 28 billion bottles, 4 million tons of plastic. 40 million tons of paper, 100 million tires and 3 million cars. All of these materials can be recycled to save energy, save landfill space and reduce pollution. The remainder of our waste that is landfilled must not be forgotten, but controlled and managed for decades until it has safely decomposed and stabilized. We are all responsible for what we throw away and the impacts this waste may have on our environment.



Sudy Questions

1. **Name three specific ways you can personally reduce the amount of trash you dispose of.**

2. **What does rain turn into when it flows through older landfills? Why must it be controlled?**

3. **Why is it important to protect groundwater?**

MONEY TREE

Objective

Students will develop an appreciation of general forest ecology.

Key Words

Ecology, Canopy

Summary

The forest resource is very important. Trees provide shade, beauty and many wood products to make our lives more enjoyable. But, they also serve other important functions. Leaves absorb carbon from the air and release oxygen in its place. Tree canopies provide a "speedbump" to raindrops and lessen the impact they have on soils. Forests provide homes and habitats for many species of wildlife. Extensive root systems hold soil in place and organic matter from leaves and debris enrich the soil.

Forests provide income to many people. Timber is the second leading agricultural crop in Tennessee. Forest products contribute $4 billion to the economy of Tennessee every year.

Study Questions

1. Why do trees grow straight up even when they are in the side of a mountain?

2. What is the Tennessee State Tree?

3. How can we improve our forested land and harvest it at the same time?

SHOPPING GREEN

Objective

Students will compare and determine what products, when given a choice, are most "GREEN". Students will learn how to protect the environment by "PRE-CYCLING".

Key Words

Post-Consumer Waste, Recyclable, Packaging, Pre-Cycling

Summary

When grocery shopping we all make choices for different reasons. We may choose the least expensive items while others may buy the most expensive. Still others may buy the biggest or most colorful.

One thing that we should ask before we buy, however, is "How will this product effect our environment after I buy it?" and "What is this made of and where will it go if I throw it away?" These are questions that can be answered if we all begin to "Shop Green" and "Pre-Cycle."

Valuable landfill space can be saved through recycling the products or packaging that we buy everyday. If a product states that it is made of recycled material or post-consumer waste, you know the material has already been saved at least once from entering the earth in a landfill. Plastics, aluminum, paper and glass are all materials that can be recycled.

Another question to ask is whether or not the item has been over packaged. If we buy less bulk, we throw less away. This is "Pre-Cycling". When we buy a product we are also buying trash, so we should make selections based on less packaging. This will save valuable landfill space and save money! If we purchase with Pre-Cycling and Shopping Green in mind then that's great for everyone, including the environment.

Study Questions

1. What is "Shopping Green?"

2. What are some things to look for while Pre-Cycling?

3. Why are these things important?

ENVIR IQ

Objective

Students will be quizzed on their general knowledge of selected conservation topics.

Key Words

Household Hazardous Waste

Summary

Many household products that we use routinely in our homes and lifestyles become hazardous to our health when simply tossed into the trash or washed down the drain. Chemicals washed down drains and thrown into landfills can end up back in our drinking water source. This can affect our health and the environment. Substitutes for many of these products are available. These substitutes are safe, easy alternatives to cleaners, detergents, air fresheners and insect sprays.

With the growing amount of trash being taken to landfills, space is quickly being used up. Many items such as plastic, aluminum, steel, iron, paper, batteries, oil and tires can be recycled. These materials can be used to make new items or as fillers. Used oil and tires are often used in making asphalt.

There are many occupations associated with agriculture other than farming. Processing, trucking, finance, grocery store clerks and even meteorologists play key roles in agriculture and conservation. Trees help the environment in many ways like providing shade and controlling erosion, and forestry is an important agriculture enterprise.

Study Questions

1. Name some common ousehold items considered hazardous waste.

2. Name five occupations associated with agriculture.

3. Name five ways trees help the environment.

OIL SPILL

Objective

Students will understand the complex proccesses involved with cleaning up an oil spill and the harmful effects of oil on a coastal system.

Key Words

Oil, Containment, Ecosystem

Summary

In recent years our worlds oceans and coastal areas have been threatened by the oil spills. Although transportation of this valuable resource is a necessity, accidents occured during the movement of the commodity can have harmful, even deadly effects on the world's coastal ecosystems. Populations of wildlife, including birds, fish and other sea creatures, can easily be wiped out by even a small oil spill in a critically threatened area. Through better public education and industrial safety measures, the risk of oil spills can be greatly reduced.

This exercise will show methods by which oil could be cleaned from the world's oceans. It will additionally demonstrate the harmful effects that occur when oil reaches coastal area ecosystems.

Study Questions

1. What negative impacts can oil have on a coastal ecosystem?

2. What methods are used to clean up oil spills?

3. What can be done to help prevent future oil spills?

THINK ABOUT IT

Objective

Students will test their knowledge in general water quality and river protection.

Key Words

Endangered Species

Summary

The Clinch and Powell Rivers flow from Virginia into Tennessee and drain all or parts of Claiborne, Grainger, Hancock, Hawkins and Union Counties. These rivers are two of the last free flowing rivers in the Tennessee River system. Free flowing means the flow of water is not controlled by dams upstream. The Clinch and Powell are known worldwide for their biodiversity. Biodiversity means there are a few specimens of many different species. When a river is biodiverse that is a good sign that it is healthy. The Clinch and Powell Rivers are home to 17 threatened and endangered species. These rivers are especially noted for the vast number of species of freshwater mussels living there (about 50 species). Mussels are one of the first species to die in a polluted river because they live on the river bottom and filter water through their bodies. When the pollution builds up to a toxic level in the mussels, they die. This makes mussels a good indicator of water quality.

Pollution is a rising concern in the Clinch and Powell Rivers as well as other rivers across the nation. Pollution comes from many sources classified as either point or nonpoint. Nonpoint source pollution (small amounts of pollution coming from many places and sources) is the main threat in the Clinch and Powell Rivers. The most common form of nonpoint source pollution is sediment. Sediment is soil suspended in water and makes the water appear muddy. Soil erosion is the biggest producer of sediment and may come from farming practices and construction sites.

Study Questions

1. What is an endangered species?

2. Name three sources of nonpoint source pollution.

3. Name five things you can do to stop water pollution.

GLOSSARY OF KEY TERMS

Aquatic Invertebrates: No backbone animals that live a portion of their life on the bottom of streams, rivers and lakes.

Benthos: The organisms living on streams, rivers or lake bottoms.

Best Management Practices: Practices which will protect the quality of the environment

Biodegrade: Decomposition by natural biological processes.

Burrowing Animals: Animals which dig holes in the ground for cover.

Canopy: Layer formed by the leaves and branches of the forest's tallest tress.

Conservation: The use of natural resources in a way that assures their continuing availability to future generations; the intelligent use of natural resources.

Conservation Tillage: A method of farming which leaves a 30 percent cover on top of the soil after the crop is planted.

Containment System: Will prevent an oil spill from spreading during the clean-up proccess

Contour Farming: A method of farming where all operations are carried out on or as near to the contour of the land as possible.

Cover Crops: Plants which are grown to cover the ground between normal crop seasons.

Crop Rotations: A system of growing crops and sod in a regular alternating pattern over a period of years.

Data: Factual information like measurements or statistics used as a basis for discussions and making decisions.

Decompose: To break down into basic elements; to rot. Decomposition is necessary for all life forms since it makes essential nutrients available for use by plants and animals.

Detritus: Dead plant, animal or other organic matter.

Dissolved Oxygen: Oxygen which is dissolved in water and available for use.

Ecology: The scientific study of the relations of living things to one another and to their environment.

Ecosystem: All living things and their environment in an area of any size. All are linked together by energy and nutrient flow.

Endangered Species: One which has so diminished in numbers that is destined for extinction unless drastic measures are taken to protect it.

Environment: The aggregate of surrounding things, conditions or influences, especially as affecting the existence or development of people or of nature.

Erosion: The process of eroding or state of being eroded. Natural processes, as weathering or gravity, by which material is moved on the earth's surface.

Forest Hydrology: Study of inflow and outflow of water in the forest.

Fungicide: Any chemical preparation used to control fungal pests.

Geographic Information System: A means of using data stored on a computer to produce graphic (picture) images (mostly maps). The GIS retrieves information stored in a computer database to make the images.

Grassed Waterway: A grassed area in the natural or constructed drainage way to slow runoff and prevent gully formation.

Habitat: The native environment of an animal or plant, or the kind of place that is natural for an animal or plant.

Herbicide: Any chemical preparation for killing plants.

Household Hazardous Waste: Any product found in the home that can be hazardous if not disposed of safely (ie floor cleaners, pesticides and paint products).

Indicator Animals: Animals which are extremely sensitive or very tolerant of certain pollution.

Landfill: A specially-designed site for the burial, disposal and decomposition of solid waste.

Leisure Time: Time free from work or duties, i.e. time available to pursue recreational activities.

Limestone: A sedimentary rock found extensively in areas of karst topography.

Natural Areas: Sites used for recreational purposes which have no development and as little management as possible.

Nesting Birds: Birds which make nests to lay eggs in reproduction.

Oil: Slippery, combustible liquid obtained from animals, vegetables, etc.; petroleum

Packaging: What as item may be wrapped or contained in when bought.

Percolate: The filtration process of liquid through soil.

Pesticide: Any chemical preparation used to control populations of injurious organisms, plants or animals.

Pollution: Harmful substances used deposited in the air or water or land, leading to state of dirtiness, impurity or unhealthiness.

Post-Consumer Waste: Material that has already been used and then recycled.

Predator: An animal that lives by capturing other animals for food.

Pre-Cycling: Making purchases based on the amount of packaging.

Rapid Bioassessment Survey: A test used by biologists to test the physical properties and the biological community to quickly determine the quality of the water.

Reclaim: To rescue, clean up and repair a polluted or damaged site.

Recycle: The salvage and reprocessing of waste materials for reuse in the same form or to manufacture new products (cloth, glass, paper, metal, plastic, oil. etc..)

Recyclable: Item that can be recycled, but may not have been already.

Reservoir: Bodies of water which are collected and stored in natural and artificial lakes. Lakes or large inland bodies of water. In the Tennessee Valley, the reservoir system was created by constructing dams on the Tennessee River and tributaries. The dams are built to provide flood control, navigation channels, electric power production, recreation and adequate water supply.

Resource: Something that can be looked to for support or aid. An accessible supply that can be withdrawn from when necessary.

Riparian: Of, on, or relating to the bank of a natural course of water.

Sinkhole: A natural depression in a land surface leading to an underground passage. Occurs frequently in limestone regions and forms by solution or by the collapse of a cavern roof.

Solid Waste: Garbage, trash, debris and other materials considered worthless or used-up that are discarded by humans.

Species: A class of organisms having some common characteristics or qualities.

Stewardship: The careful management of precious resources.

Stream Management Zone: The area on both sides of a watercourse which should be protected with permanent cover like grass or trees.

Strip Cropping: A system of growing crops and hay in alternating bands across a field.

Topsoil: The surface layer of soil which is the most productive.

Toxic: Harmful, destructive or deadly

Turbidity: Having suspended or stirred up particles or sediment.

Water Cycle: The recirculation process of water on earth and in the atmosphere.

Watershed: Unit of study of forest hydrology.

Weathering: To discolor, disintegrate, wear or otherwise affect adversely by exposure.

Wellness Movement: A trend toward living with emphasis on the prevention of illness through exercise, nutrition and other individual effort.

Wetlands: A lowland area that is saturated with moisture. Very productive wildlife habitat.